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Technical Report

Noise
Environmental Impact Statement
Thousand Springs Power Plant
Northeastern Nevada

November 1989

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1.0
INTRODUCTION

The Noise Technical Report was prepared as supporting documentation for the Environmental Impact Statement (EIS) for a proposed coal-fired power plant which the Thousand Springs Generating Company (TSGC) plans to construct and operate in Elko County, Nevada. TSGC is a consortium of investors. Sierra Pacific Resources is a member of the consortium and acts as project manager for the consortium. The proposed project involves a land exchange with the Bureau of Land Management (BLM) as well as construction and operation of the power plant and is called the Thousand Springs Power Plant (TSPP) project.

1.1 LAND ACQUISITION

The proposed action relative to land acquisition is to conduct a land exchange between the TSGC and the BLM. TSGC is offering approximately 12,774 acres of private lands in the Snake Mountains and 640 acres in Toano Draw in exchange for approximately 15,962 acres of public lands in Toano Draw.

The proposed land exchange would proceed on a surface estate only basis (i.e., mineral rights to the lands would not be exchanged). Measures would be taken to protect access, thereby enabling the BLM to continue to administer the public lands in the Toano Draw area. Similarly, all previous access routes from all directions will be preserved for public access purposes except for the immediate fenced project area.

1.2 DESCRIPTION OF THE PROPOSED POWER PLANT

1.2.1 Design of the Power Plant

The TSPP electric generation complex, upon completion of development, would consist of eight 250-megawatt (MW) (nominal net) coal-fired, steam-electric generating units, designed for baseload duty but with load cycling capability. The proposed action includes eight units that are essentially replicates of the Number Two generating unit at the North Valmy Power Plant, jointly owned by Sierra Pacific Power Company (Reno, Nevada) (a subsidiary of Sierra Pacific Resources) and Idaho Power Company (Boise, Idaho). It is expected that the air emissions control systems for TSPP would be similar to the North Valmy Unit Two system with modifications necessary for compliance with regulations that have become effective since that unit was constructed. As proposed, the TSPP would burn pulverized low-sulfur western coal, use a dry-type sulfur dioxide scrubber to conserve water, use a baghouse filter for particulate removal as the most effective available technology in conjunction with the use of low-sulfur coal, and use a counterflow cooling tower as the most favorable based on net energy efficiency. i.e., low pumping requirements, and to minimize potential freezing problems. Any deviations from the basic design of North Valmy Unit Two would be dictated by a change in governmental regulations, Best Available Control Technology (BACT) requirements, modernization of equipment by suppliers, or engineering needs due to the difference in location and altitude. The Number Two generating unit at North Valmy was selected as the proposed design because of its reliability and availability, and also because of its ability to meet or exceed current environmental regulations with proven technology. This was recognized by the National Society of Professional Engineers when it was selected as one of ten outstanding engineering achievements of 1985 in the United States.

Major components of each power generation unit would be as follows: the steam generator (boiler); turbine-generator; air emissions control systems (baghouse, dry scrubber, boiler); stack; circulating water (cooling water) system; water supply, storage, and treatment facilities; waste management and disposal facilities; fuel receiving, storage, and handling facilities; fire protection systems; emergency power; and construction worker accommodations. Ancillary facilities for the plant as a whole would include access road(s), parking areas, railroad spur, switchyard, offices, warehouses, maintenance facilities, and temporary construction facilities. An 8-foot-high chainlink security fence would be provided around the main plant area. Gates would be provided at all access roads and railroad entrances.

1.2.2 Construction Worker Accommodations

On-site housing would be provided for the construction workers. Bachelor quarters would be provided for approximately 220 construction personnel. The quarters would be composed of several buildings and could house two workers to a room with a bathroom. There would be a staffed kitchen, mess hall, laundry room, and recreation hall.

In addition, a recreational vehicle park would be constructed to accommodate approximately 300 vehicles. This park would consist of parking spaces, electrical, water, and sewer hook-ups, shower/toilet facilities, and laundry building.

1.2.3 Access Road

The proposed plant access road would run from Highway 93 near Wilkins, east for approximately 4 miles along an existing county road, and then southeast to the project site. The county road would be upgraded, and approximately 10 miles of new road would be constructed from the county road southeast to the plant site. A stream-crossing culvert would be used to cross the main channel of Thousand Springs Creek. An earthen embankment would carry the road across the remainder of the floodplain. Smaller pipe culverts would be used, as required, for crossing other minor drainage channels. The access road to the plant would be fenced with a three- or four-wire, BLM-specified fence to prevent domestic livestock from encroaching on the road while allowing wildlife to cross. A paved parking area would be provided near the administration offices. Gravel bed maintenance roads would be used to service the evaporative wastewater pond and cooling tower.

1.2.4 Railroad

The Southern Pacific Railroad has a two-track line from east of the plant site that passes through Montello and Cobre to Wells. A railroad spur, to transport coal to the facility, would be constructed off of the Southern Pacific Railroad track beginning approximately 3 miles northwest of Cobre at Valley Pass and would travel northwest to the plant site. The railroad spur, unloading loop, and switchyard would be designed and constructed in conformance with railroad standards. The railroad spur to the plant site would be fenced using the same specifications as those for the access road. The loop would be designed so that two unit trains could unload coal simultaneously.

1.2.5 Construction of the Power Plant

The proposed power plant, upon completion of development, would consist of eight 250 MW coal-fired, steam-electric generating units. Construction of the first unit would fall into seven distinguishable but overlapping phases:

1. Access road construction and site preparation
2. Construction of internal access and utility network
3. Construction of plant facilities (housing, shops, fire pumphouse, etc.)
4. Concrete foundation installation
5. Structural steel erection
6. Major equipment and main building erection
7. Piping, electrical connection, and instrumentation installation

Construction of the first unit is scheduled to commence in early 1991 and be completed in late 1994. Commercial operation of this unit is anticipated in the second quarter of 1994. Construction of additional generating units would require about 34 months each and would overlap with the preceding unit by 10 months. This would allow for an efficient transition of resources from unit to unit.

The first peak of construction workers is anticipated to be 805 workers in 1993, associated with construction of Units 1 and 2. The average workforce during that year is anticipated to be approximately 500. A second workforce peak is anticipated between the completion of the fourth and fifth units.

Site clearing, grading, and surfacing would be confined to those areas to be built upon, utilized during construction, or which are part of the ash disposal area. Site clearing would be conducted on an "as-required basis," and individual areas would be cleared just prior to construction startup. Vegetation that required removal would be disposed of on site in a Class III disposal site. In total, approximately 1780 acres of land would be disturbed for construction of the power plant and ancillary linear facilities upon completion of development.

1.2.6 Operation of the Power Plant

The proposed action is for the power plant to be a baseload power plant, operating 24 hours a day, 365 days per year. The plant would operate using three 8-hour workshifts. The operational workforce would be approximately 145 persons, for each pair of units or 564 operation workers upon buildout of all eight units.

Coal would be delivered to the plant site by unit trains. The coal would be produced from mines at Kemmerer, Wyoming and Scofield, Utah. Each mine would supply coal in an amount equal to 50 percent of the heat input to the generating units. Coal would be delivered along a new rail spur, approximately 14 miles long, between the Southern Pacific Transportation Company's main line at Valley Pass and the plant site. It would be the responsibility of Southern Pacific Railroad to deliver coal to and over the new rail spur and to the power plant.

The turbine-generator of each unit would have a nominal gross (nameplate guarantee) rating of 267,521 kilowatts (kW), which would yield a net output of 250,000 kW. The maximum gross generating capability (maximum load) for each unit would be 292,666 kW with the control valves wide open, and steam at 5 percent overpressure (above the nominal design pressure).

The estimated normal average load factor for a unit would be 85.8 percent for the first 5 years of operation. The load factor would progressively decrease to an estimated 53.2 percent in the 31st year of operation and thereafter. The average load factor for each unit over its expected 35 years of operation would be about 75 percent.

The air emissions control system would reduce the stack gas emissions of particulate matter (fly ash) and sulfur dioxide (SO_2) to below the regulatory prescribed maximum. The control system would include a lime spray dry scrubber system to remove sulfur oxides (SO_x) and a fabric filter to remove particulates. Generation and emission of nitrogen oxides (NO_x) would be controlled by design and control of the combustion process within the furnace.

Water, for use in generating steam and for transferring plant generated waste heat to the atmosphere, would be obtained from wellfields in the Thousand Springs drainage basin. The wellfield to supply two or three generating units would be located in Toano Draw Subbasin, which is also where the power plant would be located. For the other five or six units, it is expected that one or more wellfields would be developed along the lower reaches of Thousand Springs Creek in the vicinity of Gamble Ranch. The estimated maximum plant water requirement is 4000 acre-feet/year per generating unit, or 32,000 acre-feet/year upon completion of plant development.

Water management facilities at the power plant would be designed for "zero discharge." The maximum practical reuse and recycling of water is planned. All wastewater generated by the plant which could no longer be reused would be evaporated from on-site holding ponds, so there would be no off-site discharge of any plant wastewater.

1.3 DESCRIPTION OF ALTERNATIVES

In addition to the Proposed Action, several alternatives were identified. The alternatives considered in this analysis are grouped into five categories: power generation alternatives, site alternatives, project component alternatives, land acquisition alternatives, and no action alternative. Table 1-1 summarizes all project component alternatives considered and those selected for analysis.

The remainder of this report is organized as follows: Section 2.0 describes the affected environment, and Section 3.0 discusses the environmental consequences. References are provided in Section 4.0.

Table 1-1. SUMMARY OF ALL PROJECT COMPONENT ALTERNATIVES CONSIDERED AND THOSE SELECTED FOR ANALYSIS

Project Component	Proposed Action	Alternatives Considered	Alternatives Selected for Analysis
Power Generation	Eight 250-MW coal-fired units	Solar Wind Nuclear Fusion Geothermal Hydroelectric Solid Waste Cogeneration Oil or Natural Gas Nuclear Fission	No Action
		No Action	
Site	Toano Draw	Nine Candidate Site Regions Throughout the State	None
Access Road	Off of Highway 93 near Wilkins	Moor Summit Off of State Highway 233 Near Cobre	Moor Summit
		Brush Creek Off of Highway 93 3.5 Miles South of Wilkins	Brush Creek
Railroad	Off of Southern Pacific near Cobre	Off of Union Pacific near Wells Paralleling Highway 93	None
Construction Workers Accommodations	On-site Construction-Worker Camp and RV Park	Construction-Worker Camp and RV Park Near Cobre	No Construction-Worker Camp
		Construction-Worker camp and RV Park Near Wilkins	
		No Worker-camp	

Table 1-1. SUMMARY OF ALL PROJECT COMPONENT ALTERNATIVES CONSIDERED AND THOSE SELECTED FOR ANALYSIS (continued)

Project Component	Proposed Action	Alternatives Considered	Alternatives Selected for Analysis
Cooling System	Mechanical Draft Cooling Towers	Natural Draft Cooling Towers Cooling Ponds Dry Mechanical Draft Cooling Towers Wet/Dry Towers	None
Water Supply	Wellfield for 3 Units South of Plant Site in Toano Draw; Wellfield for 5 Units in Gamble Ranch Vicinity	Wellfield for 2 Units South of Plant Site in Toano Draw; Wellfield for 1 Unit North of Plant Site in Toano Draw; Wellfield for 5 Units in Gamble Ranch Vicinity Wellfield for 2 Units South of Plant Site in Toano Draw; Wellfield for 6 Units in Gamble Ranch Vicinity	Wellfield for 2 Units South of Plant Site in Toano Draw; Wellfield for 1 Unit North of Plant Site in Toano Draw; Wellfield for 5 Units in Gamble Ranch Vicinity Wellfield for 2 Units South of Plant Site in Toano Draw; Wellfield for 6 Units in Gamble Ranch Vicinity

Table 1-1. SUMMARY OF ALL PROJECT COMPONENT ALTERNATIVES CONSIDERED AND THOSE SELECTED FOR ANALYSIS (continued)

Project Component	Proposed Action	Alternatives Considered	Alternatives Selected for Analysis
Oxides of Nitrogen Control	Low-NO_x burner with combustion modification	Selective Catalytic Reduction with Ammonia Noncatalytic Reduction with Ammonia Noncatalytic Reduction with Area Low NO_x Burner Flue Gas Recirculation Fluid Bed Combustion	None
Sulfur Dioxide Control	Lime Spray Drier	Wet Scrubber Fluid Bed Combustion Limestone Injection into Furnace Dry Lime Injection into Duct	None
Particulate Matter Control	Baghouse	Electrostatic Precipitator	None

Table 1-1. SUMMARY OF ALL PROJECT COMPONENT ALTERNATIVES CONSIDERED AND THOSE SELECTED FOR ANALYSIS (concluded)

Project Component	Proposed Action	Alternatives Considered	Alternatives Selected for Analysis
Land Acquisition	Land Exchange	Land Tenure Adjustment	Land Tenure Adjustment
		Selling the Public Lands	Selling the Public Lands
		No Action	No Action

2.0
AFFECTED ENVIRONMENT

2.1 STUDY AREA DEFINITION

The project area is in a remote location in which the only major man-made noise sources are trains and vehicular traffic. An initial screening for background noise levels in the vicinity of the project area was performed in April 1989. This study encompassed an area in the Toano Draw within about a 12-mile radius of the proposed plant site. The study area was bordered by Windermere Hills on the west (east of Highway 93), Thousand Springs Valley on the north, Murdock Mountain on the east (west of Highway 233), and the Pequop Mountains on the south (north of Highway 80). Within this study area, the only residential sites are on the east side of Black Mountain, approximately 9 miles west-southwest of the project site; at Winecup Ranch, approximately 8.5 miles northwest of the project site; and near Toano, approximately 14.5 miles south-southeast of the project site. Areas further away which may be impacted by project-related sources (i.e., increased train activity) include the towns of Montello and Cobre. To characterize these areas, the town of Montello was included in the initial screening effort.

2.2 FUNDAMENTALS OF NOISE

There is wide variation in the human perception of noise because of the range in noise intensity (amplitude), pitch (frequency), and time duration (sudden, intermittent, occasional, continuous, etc.). While there are several methods for describing these properties of sound, only a few are generally accepted as noise measures.

Sound "loudness," measured in decibels (dB), is a perception of the energy in sound waves. Sound energies encountered in a typical day may range over ratios of up to 10 million to 1. In order to effectively deal with this range, sound levels are measured on a logarithmic scale, which compresses this range to 70 to 1.

Since a logarithmic scale is used, individual sound levels cannot simply be added to obtain an overall measure of noise. For example, the addition of a 51 dB noise source to an existing noise level of 50 dB results in an overall sound level of 54 dB, rather than 101 dB. Furthermore, if two noise sources differ by 10 decibels or more, the larger source effectively "drowns out" the smaller one and no increase in noise level over the larger source is perceived.

The human ear selectively perceives sound frequencies. A young child with full hearing capacity has a sound frequency range from around 20 cycles per second (hertz or Hz) to 20,000 Hz. Over time, health problems and excessive noise exposures normally reduce this range. The most sensitive frequency range of the human ear is approximately 1000 to 6000 Hz, and certain frequencies in this range are not perceived as being of equal loudness even if they actually are. To account for this selectivity, measured sound levels are often given a weighting factor to more closely resemble human perception. Several weighting functions exist and all have in common the principle of assigning different weighting factors to the various frequency ranges. The most common weighting method is called "A-weighting." All references to noise in this report refer to "A-weighted" decibel levels or dBA. Table 2-1 contains a list of noise levels on the dBA scale typically experienced in daily activities.

Since most sounds fluctuate from moment to moment, it is necessary to consider a time element in making noise measurements. For example, the sound of a passing car or train progresses from being just perceptible as

Table 2-1. RELATIVE SCALE OF VARIOUS NOISE SOURCES AND EFFECT ON PEOPLE

PUBLIC REACTION		NOISE LEVEL (dBA)	COMMON INDOOR NOISE LEVELS	COMMON OUTDOOR NOISE LEVELS
		110	Rock Band	Jet Flyover at 1000 ft.
Local Committee Activity with Influential or Legal Action		100	Inside Subway Train (New York)	Gas Lawn Mower at 3 ft.
Letters of Protest	4 times as loud	90	Food Blender at 3 ft.	Diesel Truck at 50 ft.
Complaints Likely	Twice as loud	80	Garbage Disposal at 3 ft. Shouting at 3 ft.	Noisy Urban Daytime
Complaints Possible	Reference	70	Vacuum Cleaner at 10 ft.	Gas Lawn Mower at 100 ft.
			Normal Speech at 3 ft.	Commercial Area Heavy Traffic at 300 ft.
Complaints Rare	1/2 as loud	60	Large Business Office	
Acceptance	1/4 as loud	50	Dishwasher Next Room	Quiet Urban Daytime
		40	Small Theatre, Large Conference Room (Background)	Quiet Urban Nighttime
				Quiet Suburban Nighttime
			Library	
		30	Bedroom at night Concert Hall (Background)	Quiet Rural Nighttime
		20		
			Broadcast and Recording Studio	
		10		
			Threshold of Hearing	
		0		

it approaches, to a peak level as it passes, to being imperceptible as it moves away. A convenient way of measuring a sound that varies with time is to calculate the total sound energy of the event. The total sound energy is termed the sound exposure level or SEL.

In a community noise survey, many sounds recur, overlap, or continue throughout the day. Several measures are used to provide a common basis for characterizing this variability in sound. One of these measures is the equivalent sound level (L_{eq}). This is a measure of the energy-averaged (A-weighted) sound level over a given period of time. For an overall characterization of community noise, it is most convenient to derive a number that is typical of a 24-hour day. This could be accomplished by averaging 24 hourly L_{eq} measurements or conducting a 24-hour continuous noise monitoring study. These methods, however, do not account for the higher level of disturbance experienced at night when a noise intrudes on a period of sleep or quiet residential activity. To model this nighttime disturbance factor, a common noise measurement is the day-night sound level (L_{dn}).

L_{dn} defines "daytime" hours as 7 a.m. to 10 p.m. and "nighttime" hours as 10 p.m. to 7 a.m. Noise occurring at night is "penalized" by adding 10 dB to actual sound levels. For example, a 70-dB noise level at night would be treated as 80 dB for determining impacts. Generally, L_{dn} is used and recommended for environmental studies by professional groups and federal agencies such as the U.S. Department of Housing and Urban Development (HUD) and the U.S. Environmental Protection Agency (EPA).

Another useful noise measurement is the statistical sound level (L_x). This is a measure of the sound level which is exceeded by a fluctuating sound for a certain percent of the sampling time. For example, L_{10} is exceeded 10 percent of the sampling time while L_{90} is exceeded 90 percent of the time.

For a point source, sound reduction with distance, or "attenuation," is attributable to two primary effects. One attenuation factor is geometric attenuation, which is caused when sound waves spread radially outward from the source (similar to rays of light), so that the intensity of sound decreases proportionally to the inverse-square of distance. Thus, if the noise level from a point source is measured at a given distance away, then at twice that distance it is one-fourth as loud, at three times as far it is one-ninth as loud, and so on. For point sources of sound, this means that each doubling of distance decreases the sound level by 6 decibels. The second attenuation factor is absorption of sound both by the ground surface and by the atmosphere. These and other types of nongeometric absorption factors are termed "excess attenuation." In this analysis, attenuation factors were applied to each noise source when applicable.

Roadway noise is dependent upon many factors: vehicle type, speed, number of vehicles, roadway surface and gradient, distance to receptor, receptor orientation toward road, and ground surface between receptor and road. Noise from trains would follow similar principles. Noise from these "line sources" usually drops off at a rate of 3 to 4.5 dBA per doubling of distance, depending upon the attenuation from the ground surface.

2.3 NOISE SIGNIFICANCE CRITERIA

There are several noise standards used to interpret the noise levels associated with this project. One is the federal noise abatement criteria used to protect noise sensitive land uses (Federal Highway Administration [FHWA] 1982). Another is the HUD acceptability categories for nonaircraft noise. The third considered is the Occupational Safety and Health Administration (OSHA) criteria for protection of workers.

Federal highway design noise levels for various land use ratings (called activity categories) are given in Table 2-2. Noise criteria are assigned to both exterior and interior activities. According to FHWA,

Table 2-2. FEDERAL NOISE ABATEMENT CRITERIA, HOURLY A-WEIGHTED SOUND LEVEL - DECIBELS (dBA)[a]

Activity Category	$L_{eq}(h)$	$L_{10}(h)$	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	--	Undeveloped lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Federal Highway Administration 1982.

[a] Either $L_{10}(h)$ or $L_{eq}(h)$ (but not both) may be used on a project. Note that "h" refers to hourly noise levels.

noise reduction through most residential structures will lead to compliance with interior design noise levels if the exterior criteria are attained.

The federal highway activity categories can be applied to land uses in the study area. Most of the land surrounding the project site is undeveloped and thus noise abatement criteria are not designated (Category "D"). The other areas are residential, which include the residences at Winecup Ranch, the east side of Black Mountain, the southwest base of Murdock Mountain, and the towns of Cobre and Montello (Category "B"). The FHWA criteria identify the noise level at which mitigation should be considered to protect various noise sensitive land uses. For example, 67 dBA is used as the criterion for residential areas.

Guidelines for outdoor noise exposure to nonaircraft noise are provided by HUD. The HUD categories of noise exposure and their respective noise limits are listed in Table 2-3. These limits apply to the boundaries of federally funded residential developments. Since noise from the power plant would essentially be constant with time, the "Acceptable" category corresponds to sound levels below 45 dBA, the "Normally Acceptable" category corresponds to levels between 45 and 65 dBA, the "Normally Unacceptable" category corresponds to levels between 65 and 75 dBA, and the "Unacceptable" category corresponds to levels above 75 dBA.

OSHA regulations stipulate a maximum noise level that should not be exceeded based on the period of exposure. For example, workers should not be exposed to noise levels greater than 90 dBA over an 8-hour period. Exceedance of this standard requires consideration of a noise abatement program and worker protection measures.

Table 2-3. HUD'S ACCEPTABILITY CATEGORIES FOR NONAIRCRAFT NOISE

Acceptable	- Noise level does not exceed 45 dBA for more than 30 minutes per 24 hours
Normally Acceptable	- Noise level does not exceed 65 dBA for more than 8 hours per 24 hours
Normally Unacceptable	- Noise level exceeds 65 dBA for more than 8 hours per 24 hours
Unacceptable	- Noise level exceeds 75 dBA for more than 8 hours per 24 hours
	- Noise level exceeds 80 dBA for more than 60 minutes per 24 hours

Source: U.S. Department of Housing and Urban Development (1971).

2.4 NOISE SURVEY

2.4.1 Methodology

Noise measurements taken during the April 1989 survey were recorded by two portable, battery-operated Metrosonics db-308 Noise Analyzers (S/N 2434 and 2435) (Metrosonics 1985) and one portable, battery-operated Bruel and Kjaer Model 2231 (S/N 1413404) Sound Level Meter. Upon completion of each noise measurement, each instrument immediately underwent a series of quality assurance tests. These included confirming the secure mode state on the Metrosonics analyzers, checking the internal clock, validating the number of sampling periods collected, and verifying the calibration with a Metrosonics Model cl-304 Calibrator (S/N 2553) or a Bruel and Kjaer Type 4230 Sound Level Calibrator (S/N 1411814), both certified as National Bureau of Standards traceable. Each unit was also calibrated immediately prior to sampling using the calibrators. The sample data were further reviewed once the survey results were transferred to a personal computer. This review was performed to verify the summary statistics generated by the units' microprocessors.

The noise analyzers were programmed to sample eight A-weighted decibel (dBA) noise readings every second and compute summary noise statistics for half-hour and 1-day periods. The analyzers processed L_{eq}, SEL, L_{10}, and L_{90} statistics. These statistical parameters were defined in Section 2.2.

2.4.2 Survey Locations

Nine monitoring sites were selected for measuring noise in the study area. Six noise survey locations were in the Toano Draw, two were in the town of Montello, and one was in Lorray Wash. The nine noise survey locations, referred to as S1 through S9, are depicted on Figure 2-1.

Survey locations S1 and S2 were both in the town of Montello. S1 was located on a dirt road one block (approximately 400 feet) from Highway 233 and was approximately 640 feet from the railroad tracks. S2 was located on the north side of Highway 233 and was approximately 240 feet from the railroad tracks. Survey location S3 was located on Lorray Wash, about halfway between the towns of Oasis and Montello, and was approximately 87 and 102 feet away from two railroad tracks and was approximately 2150 feet from Highway 233. Survey location S4 was located at Winecup Ranch. Survey location S5 was at the proposed plant site, 1 mile east of Toano Well No. 1. Survey location S6 was 3 miles east-northeast (ENE) of the plant site and 2½ miles south of Fivemile Draw Well. Survey location S7 was 7 miles ENE of the plant site near Twentyone Mile Draw. Survey location S8 was 2 miles east of Thurston Spring in the Windermere Hills. Survey location S9 was at Valley Pass, the southernmost end of Toano Draw, located 101 feet from the railroad tracks and approximately 280 feet from a dirt frontage road that parallels the tracks.

2.4.3 Baseline Results

A total of 10 noise measurements were taken at the nine monitoring sites to assess current background noise levels. The Metrosonics Noise Analyzers were used to measure hourly L_{eq}s, 24-hour L_{eq}s, and L_{dn}s at survey locations S1, S3, and S9 (Tables 2-4, 2-5, and 2-6). The town of Montello, survey location S1, had a maximum 1-hour L_{eq} of 57 dBA, while the survey locations approximately 100 feet from railroad tracks, S3 and S9, had maximum 1-hour L_{eq}s of 71 and 69 dBA, respectively.

The Bruel and Kjaer Sound Level Meter measured half-hour L_{eq}, L_{10}, and L_{90} values at sites S2, S4, S6, S7, and S8, and 24-hour L_{eq}, L_{10}, and L_{90} values at S5. Table 2-7 presents this monitored data. Survey location S2 in Montello had a half-hour L_{eq} of 46 dBA. The Winecup Ranch site, S4, had a morning half-hour L_{eq} of 33 dBA. The future plant site, S5, had a 24-hour L_{eq} of 33 dBA. The three survey locations S6, S7, and S8 each had half-hour L_{eq}s between 22 and 26 dBA.

The Bruel and Kjaer Sound Level Meter was used at survey location S9 to record the passing of trains during the same 24-hour period the Metrosonics

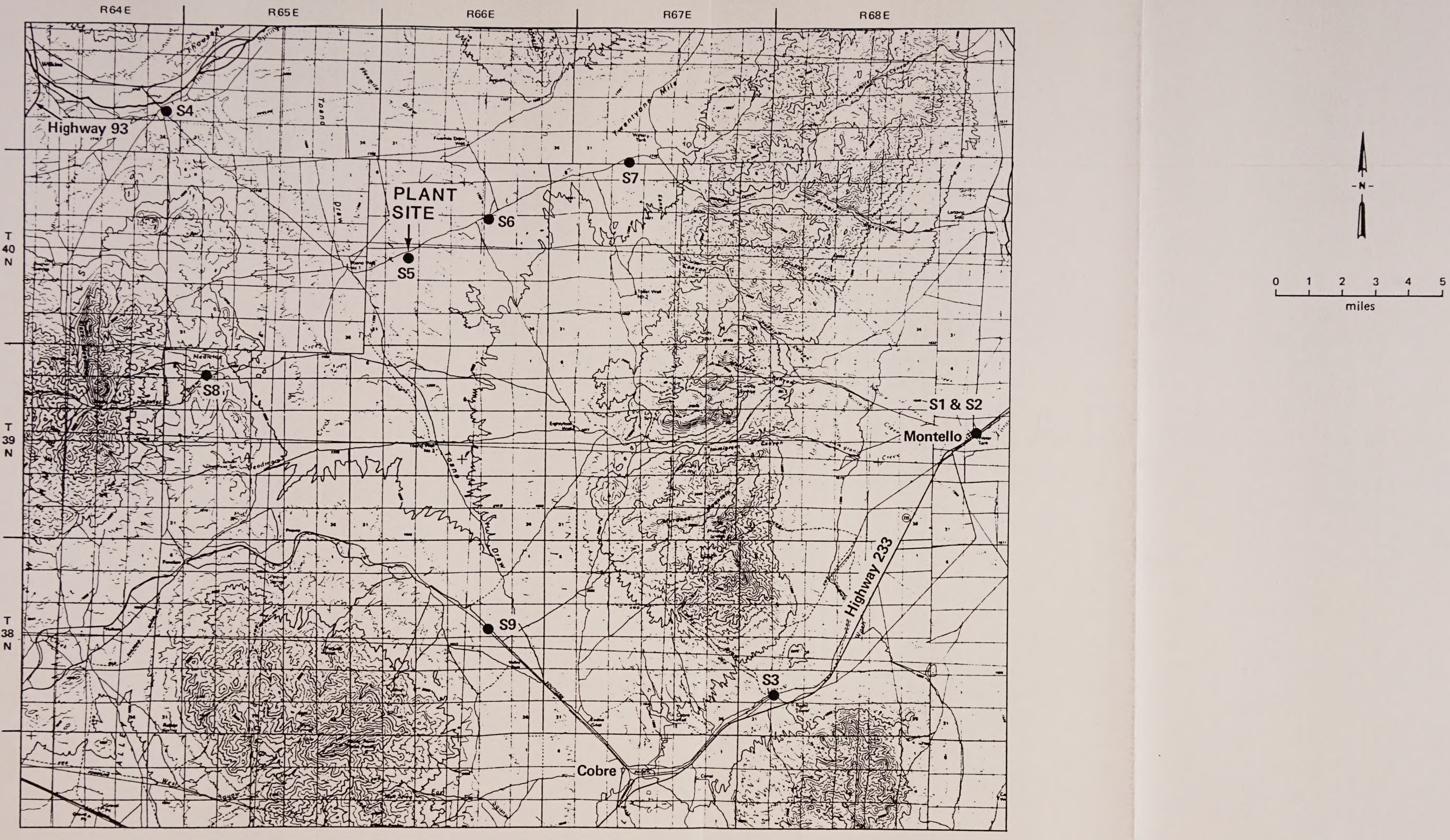

Figure 2-1. NOISE SURVEY LOCATIONS

Table 2-4. HOURLY NOISE SURVEY RESULTS MONITORED AT THE 24-HOUR SURVEY SITE S1 IN MONTELLO, NEVADA (SECTION 17/TOWNSHIP 39N/RANGE 69E)[a]

Start Date	Time Start-Stop	Noise Level (dBA)[b] L_{eq}[c]
4/10/89	1500-1600	56.4
4/10/89	1600-1700	52.4
4/10/89	1700-1800	50.2
4/10/89	1800-1900	53.4
4/10/89	1900-2000	55.2
4/10/89	2000-2100	52.7
4/10/89	2100-2200	53.6
4/10/89	2200-2300	56.7
4/10/89	2300-2400	46.9
4/11/89	0000-0100	43.2
4/11/89	0100-0200	52.9
4/11/89	0200-0300	45.4
4/11/89	0300-0400	43.2
4/11/89	0400-0500	46.5
4/11/89	0500-0600	43.5
4/11/89	0600-0700	56.7
4/11/89	0700-0800	51.4
4/11/89	0800-0900	45.7
4/11/89	0900-1000	43.6
4/11/89	1000-1100	51.2
4/11/89	1100-1200	44.6
4/11/89	1200-1300	54.8
4/11/89	1300-1400	47.5
4/11/89	1400-1500	47.2
	24-Hour L_{eq}	52.0
	L_{dn}[d]	58.2

[a] Hourly L_{eq} values are calculated from 1-minute L_{eq}s.

[b] dBA is decibels, A-weighted scale.

[c] L_{eq} (Noise Equivalent Level) is defined as the time-integrated average of noise levels present during the monitoring period.

[d] L_{dn} (Day-Night Sound Level) is defined as the 24-hour L_{eq} with a 10-dB penalty for nighttime hours (10 p.m. to 7 a.m.).

Table 2-5. HOURLY NOISE SURVEY RESULTS MONITORED AT THE 24-HOUR SURVEY SITE S3 IN LORRAY WASH, NEVADA (SECTION 29/TOWNSHIP 38N/RANGE 68E)[a]

Start Date	Time Start-Stop	Noise Level (dBA)[b] L_{eq}[c]
4/10/89	1530-1630	66.5
4/10/89	1630-1730	57.5
4/10/89	1730-1830	44.9
4/10/89	1830-1930	45.8
4/10/89	1930-2030	68.4
4/10/89	2030-2130	45.8
4/10/89	2130-2230	43.3
4/10/89	2230-2330	70.7
4/10/89	2330-0030	50.9
4/11/89	0030-0130	43.5
4/11/89	0130-0230	63.6
4/11/89	0230-0330	43.4
4/11/89	0330-0430	42.9
4/11/89	0430-0530	42.8
4/11/89	0530-0630	42.8
4/11/89	0630-0730	69.8
4/11/89	0730-0830	43.7
4/11/89	0830-0930	43.1
4/11/89	0930-1030	64.1
4/11/89	1030-1130	43.9
4/11/89	1130-1230	66.3
4/11/89	1230-1330	43.3
4/11/89	1330-1430	43.4
4/11/89	1430-1530	44.1
	24-Hour L_{eq}	62.6
	L_{dn}[d]	68.5

[a] Hourly L_{eq} values are calculated from 30-second L_{eq}s.

[b] dBA is decibels, A-weighted scale.

[c] L_{eq} (Noise Equivalent Level) is defined as the time-integrated average of noise levels present during the monitoring period.

[d] L_{dn} (Day-Night Sound Level) is defined as the 24-hour L_{eq} with a 10-dB penalty for nighttime hours (10 p.m. to 7 a.m.).

Table 2-6. HOURLY NOISE SURVEY RESULTS MONITORED AT THE 24-HOUR SURVEY SITE S9 AT VALLEY PASS, NEVADA (SECTION 14/TOWNSHIP 38N/RANGE 66E)[a]

Start Date	Time Start-Stop	Noise Level (dBA)* Leq**
4/12/89	1700-1800	43.6
4/12/89	1800-1900	67.9
4/12/89	1900-2000	62.6
4/12/89	2000-2100	65.5
4/12/89	2100-2200	43.3
4/12/89	2200-2300	65.1
4/12/89	2300-2400	43.4
4/13/89	0000-0100	66.9
4/13/89	0100-0200	43.0
4/13/89	0200-0300	43.0
4/13/89	0300-0400	43.3
4/13/89	0400-0500	68.7
4/13/89	0500-0600	42.9
4/13/89	0600-0700	44.4
4/13/89	0700-0800	63.4
4/13/89	0800-0900	62.0
4/13/89	0900-1000	44.9
4/13/89	1000-1100	68.8
4/13/89	1100-1200	62.8
4/13/89	1200-1300	45.1
4/13/89	1300-1400	65.1
4/13/89	1400-1500	45.5
4/13/89	1500-1600	50.2
4/13/89	1600-1700	53.1
	24-Hour L_{eq}	62.6
	L_{dn}[d]	68.9

---

[a] Hourly Leq values are calculated from 15-second Leqs.

[b] dBA is decibels, A-weighted scale.

[c] L_{eq} (Noise Equivalent Level) is defined as the time-integrated average of noise levels present during the monitoring period.

[d] L_{dn} (Day-Night Sound Level) is defined as the 24-hour L_{eq} with a 10-dB penalty for nighttime hours (10 p.m. to 7 a.m.).

Table 2-7. NOISE SURVEY RESULTS MONITORED AT SELECTED SITES IN AND NEAR THOUSAND SPRINGS VALLEY IN NEVADA

Site Location Section/Township/Range	Site No.	Start Date	Time Start-Stop	Noise Level (dBA)[a] L_{eq}[b]	L_{10}[c]	L_{90}[d]
Montello 17/39N/69E	S2	4/10/89	1547-1617	46.0	48.1	41.1
Winecup Ranch 25/41N/64E	S4	4/11/89	0750-0820	32.7	35.1	23.6
Plant Site 20/40N/66E	S5	4/11/89	1006-1006	32.9	30.1	16.6
Fivemile Draw, 2½ Mile S 14/40N/66E	S6	4/12/89	1035-1105	25.1	28.6	17.1
Twentyone Mile Draw 32/41N/67E	S7	4/12/89	1136-1206	25.8	29.1	17.1
Thurston Spring, 2 Mile E 05/65E/39N	S8	4/12/89	1320-1350	21.8	23.6	17.1

[a] dBA is decibels, A-weighted scale.

[b] L_{eq} (Noise Equivalent Level) is defined as the time-integrated average of noise levels present during the monitoring period.

[c] L_{10} is defined as the noise level exceeded 10 percent of the monitoring period.

[d] L_{90} is defined as the noise level exceeded 90 percent of the monitoring period.

monitors were measuring at S9. The Bruel and Kjaer was reprogrammed to measure the duration of noise events (trains) when the decibel level was above 60 dBA for more than 1 second. The calculated L_{eq} and SEL for each train passage is given in Table 2-8 along with the number of railcars for each train passage when available.

In summary, results from the baseline noise study confirmed noise levels that would be anticipated for a rural, desert environment. Twenty-four-hour L_{eq} values in the town of Montello (S1 and S2) ranged from 46 to 52 dBA, values typical of quiet "urban" settings. Measurements in rural areas (S4, S5, S6, S7, and S8) produced 24-hour L_{eq}s ranging from 22 dBA in Thurston Spring (S8) to 33 dBA at the proposed plant site (S5). These values are representative of quiet rural settings. Finally, the two locations most influenced by train traffic (S3 and S9) each had a measured 24-hour L_{eq} of 63 dBA (S3 was 87 and 102 feet from two railroad tracks, while S9 was 101 feet from a railroad track). "Noise event" (i.e., train passage) monitoring at location S9 showed noise levels ranging from 73 to 83 dBA per train passage.

Table 2-8. TRAIN NOISE SURVEY RESULTS MONITORED AT THE 24-HOUR SURVEY SITE S9 AT VALLEY PASS, NEVADA (SECTION 14/TOWNSHIP 38N/RANGE 66E)[a]

Start Date	Start Time	Duration[b] (min:sec)	Noise Level (dBA)[c] L_{eq}[d]	SEL[e]	Number of Railcars
4/12/89	1825	0:57	80.0	97.5	NA
4/12/89	1834	2:25	77.4	98.9	NA
4/12/89	1931	0:50	78.8	95.8	NA
4/12/89	2011	0:25	79.2	93.1	NA
4/12/89	2019	4:38	74.6	99.0	NA
4/12/89	2242	1:14	78.6	97.3	NA
4/13/89	0056	1:08	81.5	99.7	NA
4/13/89	0402	1:56	82.8	103.3	NA
4/13/89	0753	0:40	80.0	96.0	NA
4/13/89	0829	0:58	74.9	92.5	56
4/13/89	1045	0:54	73.8	91.1	46
4/13/89	1053	2:03	77.6	98.4	108
4/13/89	1139	4:30	73.8	98.1	94
4/13/89	1321	2:11	73.3	94.4	132

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[a] L_{eq} and SEL values are calculated from 1-second L_{eq}s.

[b] Duration of a train noise event is defined as the time the noise level is above 60 dBA.

[c] dBA is decibels, A-weighted scale.

[d] L_{eq} (Noise Equivalent Level) is defined as the time-integrated average of noise levels present during the monitoring period.

[e] SEL (Sound Exposure Level) is defined as the sound level if all the energy present during the duration of the event occurred in 1 second.

NA - Not Available.

SECTION 3

SECTION 4

3.0
ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

Assumptions relative to plant design and noise source terms were made in order to assess potential noise levels associated with the operation of the TSPP. The following sections provide descriptions of the assumed equipment noise source terms and calculated sound power levels. Noise source terms for the generation-related, substation, and construction equipment are taken from a similar two-unit plant, the North Valmy Power Plant. Descriptions of assumed vehicular and train traffic and predictions of the associated sound levels are also provided.

3.2 ASSESSMENT FINDINGS

3.2.1 Operational Noise Levels

The proposed operation of the TSPP will result in an increase of noise surrounding the plant. Radiated noise levels were calculated by assuming that the total sound power emitted by the plant is radiated hemispherically from a point approximating the plant center. Total sound power emitted was calculated by estimating the sound pressure level at each major plant surface, calculating the corresponding radiated sound power from each surface, and summing the results.

Estimated source sound pressure levels for major parts of the plant are listed in Table 3-1. These values represent the A-weighted sound pressure level approximately 3 feet from each source and were estimated from information on existing plants of capacity similar to this proposed

Table 3-1. STEADY-STATE AND INTERMITTENT RADIATED NOISE POWER FOR THE THOUSAND SPRINGS POWER PLANT (2000 MEGAWATTS)

Plant Source Surface	Surface Area (ft^2)	Estimated Source Sound Level (dBA)[a]	Power (watts)
Turbine-Gen Struct Walls	175,500	75	0.5156
Turbine-Gen Structure Roof	180,000	75	0.5288
Turbine-Gen Structure Windows	14,400	85	0.4230
Steam-Generator Struct #1	115,200	85	3.3843
Steam-Generator Struct #2	91,200	85	2.6792
SteamGen Struct #3 unenclosed	87,000	85	2.5558
SteamGen Struct #4 unenclosed	87,000	85	2.5558
Steam-Generator Struct Roof	144,000	85	4.2304
Fan Room	2,400	85	0.0705
Fan Room Inlet	400	85	0.0118
Fan Stack Ducting Total	52,800	85	1.5511
Stacks	800	85	0.0235
Cooling Towers	153,600	85	4.5124
Cooling Tower Stacks	36,480	85	1.0717
Main Transformers Total	20,000	85	0.5876
Coal Crusher Total	12,800	85	0.3760
Limestone Crusher Total	12,800	85	0.3760
Coal Handling Bulldozer	1,600	85	0.0470
Substation Reactors 230 kV	--	91	0.0143
Subst Circuit Breakers 230 kV[b]	--	105	400.0000
Subst Circuit Breakers 120 kV[b]	--	103	252.3829
Subst Transformers 22 kV/230 kV	--	91	0.0143
Subst Transformers 230 kV/120 kV	--	91	0.0143
Subst Transformers 22 kV/4.16 kV	--	86	0.0045
Subst Transformers 4.16 kV/120 kV	--	86	0.0045
TOTAL STEADY-STATE SOUND POWER EMITTED, Wt =			25.5527
TOTAL INTERMITTENT SOUND POWER EMITTED, Wt =			677.9356

[a] Three feet from source, given in dBA re: 20 μN/m^2.
[b] Peak sound pressure level, at 100 feet.

plant. In general, these levels are believed to be (conservative) generous ? (i.e., actual levels are expected to be no higher and possibly somewhat lower than the estimates). For estimation purposes, the plant wall panels were assumed to have an attenuation loss of 15 dB. These panels were assumed to be the standard insulation-filled double wall of corrugated metal commonly used for exterior walls of industrial and utility facilities.

The sound power emitted from each plant exterior surface was calculated from the corresponding estimated source sound pressure levels according to the relation:

$$W = A\ (0.929)\ (10^{-13})\ (10^{(L_p/10)})$$

In this equation, W is the sound power in watts, A is the surface area in square feet, and L_p is the A-weighted sound level 3 feet from that surface. Table 3-1 presents the calculated sound power for each of the noise sources and their corresponding surface areas for the proposed TSPP.

The sound pressure level at a given distance from the plant can be determined from the total radiated sound power by application of the following equation:

$$L_p = 10 \log_{10} W_t + 119 + DI - 20 \log_{10} r$$

In this equation, L_p is the A-weighted sound pressure level in dBA, W_t is the total sound power emitted in watts, DI is a directivity correction factor in dB, and r is distance from the source in feet. This equation assumes hemispherical radiation of the sound. This assumption is justified for cases where the area around a plant is relatively flat, as is the case at the TSPP site. This equation is applicable for distances from the plant that are several times greater than a characteristic length of the plant, such as the distance from the cooling towers to the main plant (approximately 3000 feet).

These calculations provide only an approximation of true sound levels and can be in error by as much as 6 dB because of variations in the following factors:

- Ground surface effects
- Atmospheric attenuation
- Wall transmission losses
- Actual plant geometry
- Source directivity

The second equation given above assumes a 6-dB attenuation of sound for each doubling of distance from the plant. An actual attenuation of 4 to 5 dB per doubling of distance is expected for the TSPP site due to ground surface effects, implying that actual sound levels may be several dB higher than predicted. Conversely, atmospheric attenuation, not accounted for in the above calculations, would serve to reduce actual sound levels. Overall, these two effects approximately cancel each other. Actual atmospheric absorption can only be calculated when the sound spectrum for each of the plant noise sources is known because atmospheric absorption is frequency selective. In a more rigorous analysis, wall transmission losses and true plant geometry could be accounted for, but this would require further definition of the plant design. In addition, directivity of the plant (i.e., of each of the noise sources) should be considered. However, for this plant, the effect of directivity is minimal because the actual sources are distributed, and noise-sensitive receiver locations are far from the plant center. Therefore, in the second equation above, DI was set to zero.

Typical noise levels of the major equipment items in the Thousand Springs substation are listed in Table 3-1. These A-weighted levels are estimates, based on information available on similar equipment. Each of the noise sources was assumed to radiate sound spherically, as if it were a point source, with a 3-dB correction added to account for reflection from the ground surface.

Noise characteristics of the power plant are dependent on the plant layout, and the spectrum and intensity of each noise source. Assumed noise source terms and calculated sound power levels are given in Table 3-1. The locations of the noise sources are given on Figure 3-1. On Figure 3-1, the term "Power Houses" refers to the turbine generator structures, the steam generator structures, the fan rooms and ducting, and the stacks.

Maximum 1-hour steady-state noise levels from TSPP and the substation were computed at sensitive receptor locations (Winecup Ranch, Black Mountain, Cobre, Toano, and Montello) and at most of the locations surveyed in the baseline noise study described in Section 2.0. The results of these calculations are shown in Table 3-2.

The calculated noise levels for Cobre and the town of Montello showed no increase due to projected noise levels emanating from the proposed power plant and substation. Winecup Ranch would experience a calculated increase from a maximum background level of 33 dBA to 41 dBA. The Black Mountain area would experience a calculated increase from a background level of approximately 22 dBA to 40 dBA. Likewise, calculations for the Toano area show an increase from a background level of 35 dBA to 38 dBA. Both new noise levels are within the suggested significance criteria of the HUD "Acceptable" level (Table 2-3) and are below the suggested significance 67-dBA Federal Noise Abatement Criterion for Activity Category "B" (Table 2-2).

The predicted maximum steady-state and intermittent sound levels due to the operation of all eight units along the plant boundary (fence line) at 16 points are shown in Table 3-3. Figure 3-1 shows the positions of these 16 plant boundary locations. Due to the closeness of the receptors along

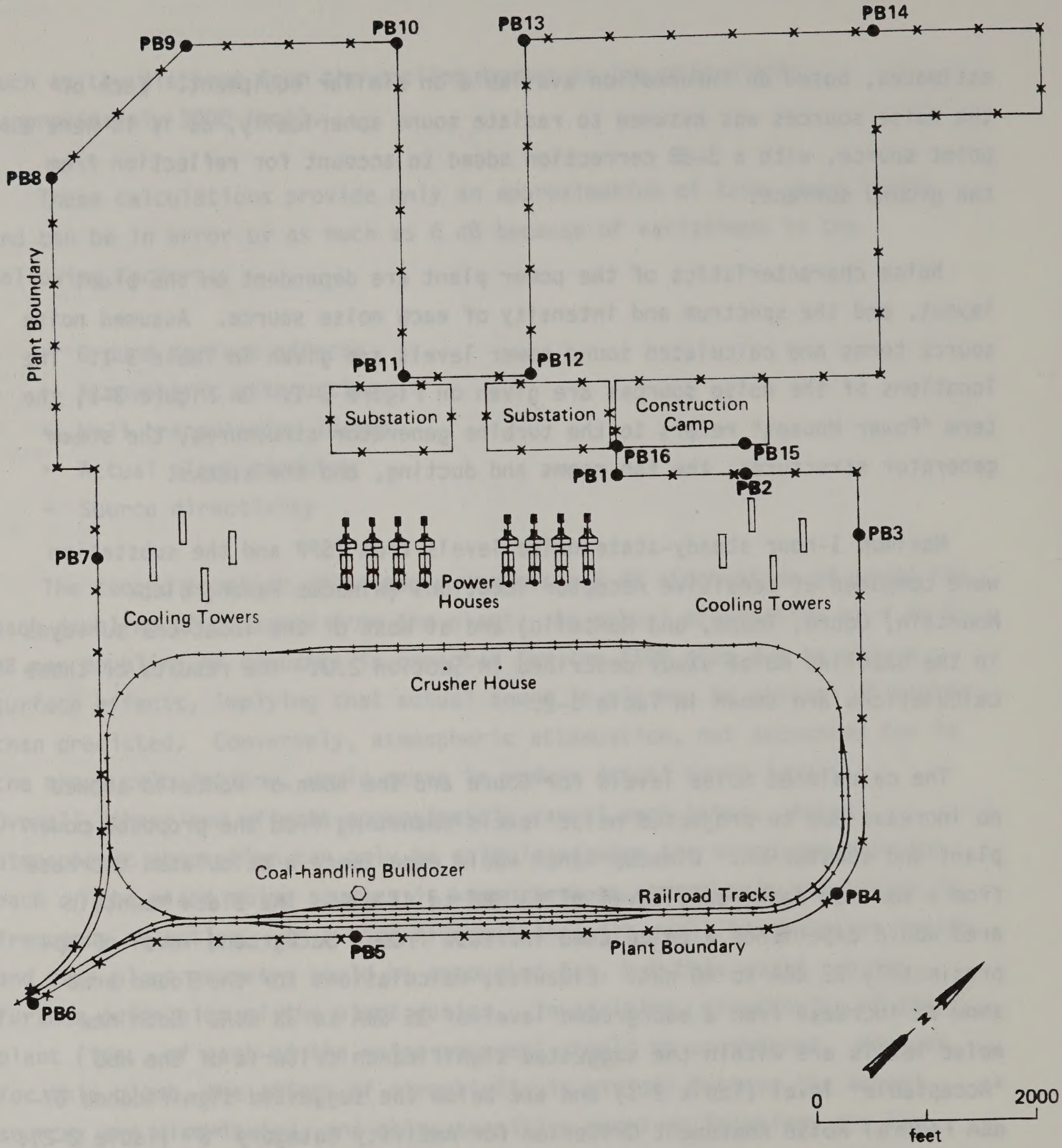

Figure 3-1. RECEPTOR POINTS ALONG THE PROPERTY BOUNDARY (PB1 THROUGH PB16) AND MAJOR NOISE SOURCES AT THE THOUSAND SPRINGS POWER PLANT

Table 3-2. PREDICTED MAXIMUM OPERATIONAL NOISE LEVEL (dBA) AT RECEIVER LOCATIONS FROM THE THOUSAND SPRINGS POWER PLANT (2000 MEGAWATTS)

Receiver Location Section/Township/Range	Site No.	Distance to Plant Center (miles)	Existing Maximum Hour Sound Level (dBA)[a]	Predicted Maximum Hour Sound Level (dBA)[a]	Predicted Maximum Intermittent Sound Level (dBA)[a]
Montello[b] 17/39N/69E	S1	18.7	57	57	57
Lorray Wash 29/38N/68E	S3	17.8	71	71	71
Winecup Ranch[b] 25/41N/64E	S4	8.5	33	41	54
Fivemile Well, 2½ mi S 14/40N/66E	S6	3.2	25	49	63
Twentyone Mile Draw 32/41N/67E	S7	7.7	26	41	55
Thurston Spring, 2 mi E 05/65E/39N	S8	6.6	22	42	56
Valley Pass 14/38N/66E	S9	11.7	69	69	69
Cobre 400 ft from Railroad[b] 04/37N/67E	c	17.1	63	63	63
Toano Mile from Railroad[b] 29/38N/67E	c	14.5	35	38	50
Black Mountain[b] 35/40N/64E	d	9.0	22	40	54

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[a] re: 20 $\mu N/m^2$

[b] Sensitive Receptor

[c] No noise measurements were taken in Cobre or Toano. Projected noise levels were estimated from the distance the railroad tracks are from the receiver location and a background noise level of 33 dBA.

[d] No noise measurements were taken at Black Mountain. Projected noise levels were considered to be approximately equivalent to Thurston Spring.

Table 3-3. PREDICTED MAXIMUM OPERATIONAL NOISE LEVELS (dBA) AT PLANT BOUNDARY LOCATIONS AT THE THOUSAND SPRINGS POWER PLANT (2000 MEGAWATTS)

Plant Boundary Location[a]	Existing Maximum Hour Sound Level (dBA)[b]	Predicted Maximum Hour Sound Level (dBA)[b]	Predicted Maximum Intermittent Sound Level (dBA)[b]
PB1	33	71	86
PB2[c]	33	70	79
PB3	33	67	76
PB4	33	60	73
PB5	33	62	74
PB6	33	58	71
PB7	33	68	77
PB8	33	59	74
PB9	33	59	75
PB10	33	59	76
PB11	33	68	93
PB12	33	68	93
PB13	33	59	76
PB14	33	58	73
PB15[c]	33	67	80
PB15[c]	33	69	88

[a] Refer to Figure 3-1.

[b] re: 20 μN/m^2

[c] Predicted sound levels are the same for seven units operation except at PB2. PB2 will have a predicted maximum hour sound level of 69 dBA.

the plant boundary, the total radiated sound power was divided into seven and sometimes more point sources to accurately represent the sound field. The predicted maximum 1-hour sound level varies from 58 to 71 dBA. Predicted noise levels at PB1, the plant boundary corner near the construction craft check station and construction change house, is the noisiest at 71 dBA. These levels are below OSHA's 8-hour 90 dBA (or 88.4 dBA for a 10-hour period) standard for protection of workers. Therefore, noise impacts within the plant site are not significant and should not require mitigation.

Table 3-3 also gives the maximum predicted "intermittent" sound levels along the plant perimeter (fence line) at several points. This intermittent noise would result from corona associated with the transmission line in wet weather and occasionally from the tripping of circuit breakers. Maximum predicted intermittent levels of 93 dBA were predicted. This maximum level is expected to occur for only short periods of time and, therefore, should not exceed OSHA significance levels.

Predictions of the maximum 1-hour and intermittent sound levels experienced by workers at the construction parking lot (PB2) and at the construction-worker camp (PB15 and PB16) were made with seven units in operation (Table 3-3). The noise levels experienced in the construction-worker camp were above the suggested FHWA Noise Abatement Criterion of 67 dBA by 2 dBA at PB16. Both construction-worker camp points (PB15 and PB16) were in the suggested significance HUD "Normally Unacceptable" category.

3.2.2 Construction Noise Levels

Noise generated from construction of the power plant would increase noise levels above existing conditions. Table 3-4 shows computed noise source terms for equipment expected to be used in site preparation and construction activities. Table 3-5 shows the combined plant, railroad, and access road estimated noise levels for the site preparation and excavation construction phases and all three different access route alternatives. The

Table 3-4. NOISE RANGES OF CONSTRUCTION EQUIPMENT

Equipment	Approximate Range of Noise Level at 50 Feet (dBA re: 20 $\mu N/m^2$)[a]
Internal Combustion, Earthmoving	
Compactors (Roller)	73-75
Front Loaders	72-84
Backhoes	72-93
Tractors	76-95
Scrapers, Graders	80-92
Pavers	86-88
Trucks	82-93
Scrapers (32 cu. yd, heaped)	88-91
Tractors (400 hp), Loaders (6-8 cu.yd)	86-90
Graders (250 hp)	83-86
Internal Combustion, Materials Handling	
Concrete Mixers	75-88
Concrete Pumps	81-83
Cranes (movable)	76-87
Cranes (derrick)	86-88
Internal Combustion, Stationary	
Pumps	69-71
Generators	71-82
Compressors	75-86
Impact	
Pneumatic Wenches	83-88
Jack Hammers and Rock Drills	81-98
Pile Drivers (peaks)	95-105
Other	
Vibrator	69-81
Saws	72-81

[a] Based on limited available data samples.

Table 3-5. PREDICTED MAXIMUM CONSTRUCTION NOISE LEVELS (dBA) AT RECEIVER LOCATIONS NEAR THE THOUSAND SPRINGS POWER PLANT

Receiver Location Section/Township/ Range	Site No.	Distance to Plant Center (km)	Distance to Plant Center (miles)	Existing Maximum Hour Sound Level (dBA)[a]	Predicted Max Hr Sound Level (dBA)[a] Wilkins Rd.	Predicted Max Hr Sound Level (dBA)[a] Brush Creek Rd.	Predicted Max Hr Sound Level (dBA)[a] Moor Summit Rd.
Montello[b] 17/39N/69E	S1	30.1	18.7	57	57	57	57
Lorray Wash 29/38N/68E	S3	28.6	17.8	71	71	71	71
Winecup Ranch[b] 25/41N/64E	S4	13.7	8.5	33	61	68	47
Fivemile Well, 2½ MS 14/40N/66E	S6	5.1	3.2	25	55	55	55
Twentyone Mile Draw 32/41N/67E	S7	12.4	7.7	26	47	47	47
Thurston Spring, 2 ME 05/65E/39N	S8	10.6	6.6	22	50	50	51
Valley Pass 14/38N/66E	S9	18.8	11.7	69	73	73	73
Cobre 400 ft from Railroad[b] 04/37N/67E	c	27.5	17.1	63	63	63	63
Toano Mile from Railroad[b] 29/38N/67E	c	23.3	14.5	35	53	53	53
Black Mountain[b] 35/40N/64E	d	14.5	9.0	22	49	49	48

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[a] re: 20 μn/m^2.

[b] Sensitive Receptor.

[c] No noise measurements were taken in Cobre and Toano. Projected noise levels were estimated from railroad tracks and a background noise level of 33 dBA.

[d] No noise measurements were taken at Black Mountain. Projected noise levels were considered to be approximately equivalent to Thurston Spring.

largest 1-hour sound level increase for a sensitive receptor will be experienced at the Winecup Ranch, if the Wilkins or Brush Creek Road access roads are used, and at Black Mountain, if the Moor Summit access road is used. The maximum 1-hour sound levels for the Winecup Ranch are dependent on the location and proximity of the road construction. Sound levels for the Valley Pass and Toano area are dependent on the proximity of the railroad construction. The highest 1-hour sound level at a sensitive receptor is estimated to be 68 dBA at the Winecup Ranch with the Brush Creek access road. This noise level is in the suggested significance HUD "Normally Acceptable" category (Table 2-3) and does exceed the suggested FHWA Noise Abatement Criterion of 67 dBA (Table 2-2).

3.2.3 Vehicular Traffic Noise Levels

The proposed action would result in increased traffic along State Route 93, Interstate 80, and county roads. The proposed access road would also create a new traffic noise source along its route. Traffic volumes and distribution associated with the proposed project were used to model peak 1-hour traffic noise levels. Seven different traffic scenarios were evaluated during the maximum combined construction and operation workforce period (2000). One scenario was the no action alternative. The other six varied, depending on whether the Wilkins, Moor Summit, or Brush Creek access routes were to be used and whether or not a construction-worker camp was located at the proposed site. The estimated change in noise levels as a result of increased traffic and the peak 1-hour traffic noise level was predicted at 250 feet from the roadways.

With the proposed construction-worker camp included in the analysis, the maximum noise increase associated with peak-hour traffic is estimated to be 2 dBA along Interstate 80 and 4 dBA along State Route 93. Without the construction-worker camp, the maximum noise increase is predicted to again be 2 dBA along Interstate 80, but 5 dBA along State Route 93 due to increased commutes. A change in noise levels of 2 to 3 dBA is barely detectable to the human ear, and changes below 5 dBA are generally considered acceptable (FHWA 1982); therefore, the predicted increases in traffic due to the proposed project should result in insignificant noise impacts.

The peak-hour traffic noise levels along the proposed Wilkins or Brush Creek roads is highest without the construction-worker camp for the sensitive receptors at Winecup Ranch. The estimated peak-hour noise level at Winecup Ranch is 47 dBA from the Wilkins proposed route and 53 dBA from the Brush Creek proposed route. The maximum noise level would occur during the morning and afternoon periods when workers would be driving to and from the job site. During the remainder of the day, periodic truck traffic (15 to 20 trucks/day) would result in intermittent noise. All 1-hour peak noise levels for all sensitive receptors are below the FHWA Noise Abatement Criterion of 67 dBA along State Route 93 from Wells to Wilkins.

3.2.4 Train Noise Levels

The projected increase of train traffic (one 120-car train and one 104-car train per day) as a result of the proposed project would not augment background noise levels significantly at sensitive receptors near railroad tracks. The increases in train noise at all receptors would be less than half a decibel in terms of a 24-hour average L_{eq}. Noise levels for the new trains were estimated from measurements taken on April 13, 1989, of duration, L_{eq}, and the number of railcars at Valley Pass (Table 2-8).

3.2.5 Noise Effect on Wildlife

Noise generated from the construction of the power plant, railroad, and access road would increase noise levels above existing conditions. Noise generated by construction equipment would be short term and intermittent due to the proximity of the equipment. Calculated noise levels for receiver locations due to construction are given in Table 3-5. This calculated increase in noise level is below levels of concern, although the amount of disturbance to wildlife is dependent on the sensitivity of a particular species (Moore and Mills 1977). Big-game mammals, raptors, and breeding birds would most likely avoid areas under construction, thereby reducing the amount of habitat available for wildlife. The low shrub vegetation surrounding the construction areas would not act as a good visual or sound barrier. Nonetheless, all projected noise levels are below levels of concern, and therefore, no noise-related impacts to wildlife are expected. Table 3-5 lists the projected noise levels resulting from site preparation and construction activities.

Noise impacts to wildlife resulting from the operation of the proposed plant would be similar to those projected for constructing the power plant. Comparatively, the operational noise levels, however, would be lower and more constant than the noise created by construction activities. The constant noise would allow animals to acclimate to increased decibel levels. The predicted maximum hour sound levels around the TSPP boundary indicate a decibel level of 58 to 68. The levels further from the plant boundary are expected to be lower, and thus, are not expected to cause significant impacts to wildlife. Mammals and birds that emigrate to other areas will encounter increased competition for resources. Most mobile animals will disperse into other areas until the noise level falls below an acceptable background level (Moore and Mills 1977). Since the vegetation will be cleared for the construction of the power plant, these animals would emigrate from the area even if there was no increase in noise levels. Thus, the impacts to wildlife that may occur as a result of increased noise levels are not considered significant.

3.3 MITIGATION MEASURES

Noise impacts at sensitive receptor points are predicted to occur with respect to the FHWA Noise Abatement Criteria and HUD's Acceptability Categories.

The TSPP operational noise levels for workers living at the construction-worker camp with seven of the eight units operating exceed the

FHWA Noise Abatement Criterion by 2 decibels and are in HUD's "Normally Unacceptable" category. Mitigation measures are recommended when approximately four units are operating and the noise level at the construction-worker camp is above 67 dBA during nonworking hours. (OSHA's noise standard of 88.4 dBA for a 10-hour day applies during the work hours only.) To mitigate the noise exposure to construction workers at the camp, noise reduction measures should be considered in the final design plans. Soundproofing of the residence buildings, through installation of insulation or other attenuation means, would reduce noise to an acceptable level. An alternative would be to construct a noise barrier (wall) between the construction-worker camp and the power plant, or increase the shielding around noise sources within the plant.

The construction of the access road would result in a temporary significant increase in noise at Winecup Ranch. Due to the nature of construction activities, no effective mitigation is available, and this impact is considered short-term and unavoidable. To minimize the impact, construction along the road in the vicinity of residences or other sensitive land uses should be limited to daytime hours. Construction-equipment noise-control measures of using mufflers, derating engines, sealing and lubricating tracks on bulldozers, isolating engine vibration, turbocharging, and adhering to a regular maintenance schedule could also be considered. If equipment and construction hour limits are required for the project, they should be considered for inclusion in contract specifications for project construction.

SECTION 4

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